(54) [Title of the Invention] DATA PROCESSOR AND PRINT

   CONTROLLER, DATA PROCESSING METHOD OF DATA PROCESSOR

   AND OF PRINT CONTROLLER, AND STORAGE MEDIUM FOR

   COMPUTER-READABLE PROGRAM

(57) [Abstract]

  [Object] To display the status of a printer in characters
at a display part without holding status display resources
in a data processor in advance.

  [Solving Means] In this structure, a CPU 1 acquires the
status display resources held in a ROM 13 of the printer
1000 through a printer controller 8 and stores them in a RAM
2. Then, according to the status information reported from
the printer 1000 and the status display resources stored in
the RAM 2, the status is displayed at a CRT 10.

[Claims]

[Claim 1]   A data processor which can communicate with a plurality of printers through a specific communication medium, wherein the data processor comprises:

an acquisition means for acquiring status display resources from the printers;

a storage means for storing the status display resources acquired from the acquisition means; and

a control means for displaying the statuses of the respective printers at a display part according to status information reported from the respective printers and the status display resources stored in the storage means.

[Claim 2]   A data processor according to Claim 1, wherein the status display resources include reportable status codes and message character string data corresponding to the status codes.

[Claim 3]   A data processor according to Claim 2, wherein the status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers.

[Claim 4]   A data processor according to Claim 2, wherein the message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers.

[Claim 5] A data processor according to Claim 2, wherein the data processor has a specifying means for specifying a language of the message character string data in the status display resources acquired by the acquisition means.

[Claim 6] A print controller which can communicate with a data processor through a specific communication medium, wherein the print controller comprises:

a storage means for storing status display resources; and

a transmission means for transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor.

[Claim 7] A print controller according to Claim 6, wherein the status display resources include reportable status codes and message character string data corresponding to the status codes.

[Claim 8] A print controller according to Claim 7, wherein the status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers.

[Claim 9] A print controller according to Claim 7, wherein the message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers.

[Claim 10]   A data processing method for a data processor which can communicate with a plurality of printers through a specific communication medium, wherein the data processing method comprises:

a first reception step of receiving the status display resources transmitted from the printers;

a storage step of storing the status display resources received at the first reception step into a storage part;

a second reception step of receiving the status information reported from the respective printers; and

a display step of displaying statuses of the respective printers at a display part according to the status information received at the second reception step and the status display resources stored in the storage part.

[Claim 11]   A storage medium for storing a program readable by a computer which can communicate with a plurality of printers through a specific communication medium, wherein the storage medium for storing the computer-readable program comprises:

a first reception step of receiving the status display resources transmitted from the printers;

a storage step of storing the status display resources received at the first reception step into a storage part;

a second reception step of receiving status information reported from the respective printers; and

a display step of displaying statuses of the respective printers at a display part according to the status information received at the second reception step and the status display resources stored in the storage part.

[Claim 12]   A data processing method for a printer which has a storage part for storing status display resources and can communicate with a data processor through a specific communication medium, wherein the data processing method of the printer comprises:

a transmission step of transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor.

[Claim 13]   A storage medium for storing a program readable by a computer which has a storage part for storing status display resources and can communicate with a data processor through a specific communication medium, wherein the storage medium for storing the computer-readable program has:

a transmission step of transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor.

[0001]

[Technical Field of the Invention]   The present invention relates to a data processor and a print controller, a data

processing method of the data processor and of the print controller, and a storage medium for computer-readable program, wherein a correspondence table for status codes and message character string data to be stored in a printer is transmitted to a host computer, which displays message character strings by referring to the correspondence table.

[0002]

[Description of the Related Art] In the prior art, a printing system for connecting a host computer and a printer through a two-way interface and for displaying status of the printer at a screen of the host computer was structured so as to transmit number information (status code) corresponding to the status from the printer to the host computer and to have an application on the host computer to display messages and drawings illustrating the status of the printer from the status code.

[0003] In the above mentioned printing system in the prior art, the corresponding information of the status codes and message character strings was stored in an application program of the host computer.

[0004]

[Problems to be Solved by the Invention] Since the printer in the prior art was structured in such a manner, it had a problem that it could not match all kinds of printers to be developed in the future because of restrictions of memory

resources as the corresponding information of status codes
and message character strings of every kind of different
printers should be stored in an application program in order
that a host computer should display messages corresponding
to the plural kinds of printers.

[0005] The present invention is made for solving the above-
mentioned problem and its object is to provide at low cost a
data processor and a print controller, a data processing
method of the data processor and of the print controller,
and a storage medium for computer-readable program, capable
of acquiring every kind of different status display
resources and freely reporting the state of a printer to a
user according status information transmitted from the
printer without holding status display resources in a host
computer in advance by acquiring and storing the status
display resources to be held in the printer and by
displaying the status at a display part according to the
stored status display resources and the status information
reported from the print controller.

[0006]

[Means for Solving the Problems] A first invention
regarding the present invention is a data processor which
can communicate with a plurality of printers through a
specific communication medium, wherein the data processor
comprises an acquisition means for acquiring status display

resources from the printers, a storage means for storing the
status display resources acquired from the acquisition means,
and a control means for displaying the statuses of the
respective printers at a display part according to status
information reported from the respective printers and the
status display resources stored in the storage means.

[0007] A second invention is that the status display
resources include reportable status codes and message
character string data corresponding to the status codes.

[0008] A third invention is that the status codes include
common status codes which are common to the respective
printers and status codes which are specific to the
respective printers.

[0009] A fourth invention is that the message character
string data include message character string data which are
common to the respective printers and message character
string data which are specific to the respective printers.

[0010] A fifth invention is to have a specifying means for
specifying a language of the message character string data
in the status display resources acquired by the acquisition
means.

[0011] A sixth invention is a print controller which can
communicate with a data processor through a specific
communication medium, wherein the print controller has a
storage means for storing status display resources and a

transmission means for transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor.

[0012] A seventh invention is that the status display resources include reportable status codes and message character string data corresponding to the status codes.

[0013] An eighth invention is that the status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers.

[0014] A ninth invention is that the message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers.

[0015] A tenth invention is a data processing method for a data processor which can communicate with a plurality of printers through a specific communication medium, wherein the data processing method comprises a first reception step of receiving the status display resources transmitted from the printers, a storage step of storing the status display resources received at the first reception step into a storage part, a second reception step of receiving the status information reported from the respective printers, and a display step of displaying statuses of the respective

printers at a display part according to the status
information received at the second reception step and the
status display resources stored in the storage part.

[0016] An eleventh invention is a storage medium for
storing a program readable by a computer which can
communicate with a plurality of printers through a specific
communication medium, wherein the storage medium for storing
the computer-readable program has a first reception step of
receiving the status display resources transmitted from the
printers, a storage step of storing the status display
resources received at the first reception step into a
storage part, a second reception step of receiving status
information reported from the respective printers, and a
display step of displaying statuses of the respective
printers at a display part according to the status
information received at the second reception step and the
status display resources stored in the storage part.

[0017] A twelfth invention is a data processing method for
a printer which has a storage part for storing status
display resources and can communicate with a data processor
through a specific communication medium, wherein the data
processing method of the printer comprises a transmission
step of transmitting the status display resources to the
data processor according to acquisition request of the
status display resources transmitted from the data processor.

[0018] A thirteenth invention is a storage medium for storing a program readable by a computer which has a storage part for storing status display resources and can communicate with a data processor through a specific communication medium, wherein the storage medium for storing the computer-readable program has a transmission step of transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor.

[0019]

[Embodiments (Examples)] Before describing architecture of the present embodiments, the architecture of a laser printer (LBP) applicable to a printer showing the present embodiments is described with reference to Fig. 1. There is no need to say that a printer for applying the present embodiments is not limited to a laser printer but a printer with other print technique such as an ink jet printer would be also possible.

[0020] Fig. 1 is a sectional view illustrating architecture of a laser beam printer applicable to a printer according to an embodiment of the present invention.

[0021] ⌐In the figure, an element 1000 is an LBP, which inputs and stores print information (e.g. character codes) and form information or micro-command and the like supplied from a host computer connected to outside, prepares

corresponding character patterns, form patterns, and the like according to such information, and forms images on recording paper as a recording medium. An element 1012 is an operation panel and has switches for operation and LED indicators thereon. An element 1001 is a printer control unit, which performs control of the whole LBP 1000 and analysis of character information supplied from the host computer.

[0022] This printer control unit 1001 converts mainly character information into video signals of corresponding character pattern and outputs them into a laser driver 1002. The laser driver 1002 is a circuit for driving a semiconductor laser 1003 and on-off change a laser beam emitted from the semiconductor laser 1003 according an input video sign.

[0023] The laser beam 1004 is laterally swung by a rotary polygon mirror 1005 for scanning exposure on an electrostatic drum 1006. Thereby, a electrostatic latent image of character pattern is formed on the electrostatic drum 1006. This latent image is developed by a development unit 1007 arranged around the electrostatic drum 1006 and then it is copied onto recording paper.

[0024] A cut sheet is used as the recording paper, and the cut sheet recording paper is contained in a paper cassette 1008 fixed on the LBP 1000 and taken into the device by a

paper feed roller 1009 and a carrying roller 1011 to be supplied onto the electrostatic drum 1006. The LBP 1000 comprises at least one card slot (not shown), with which an option font card and a control card (emulation card) with different language system can be connected in addition with internal font.

[0025] Fig. 2 is a block diagram illustrating architecture for controlling a data processor and a printer according to an embodiment of the present invention. Here, a description is provided using as an example the laser beam printer (hereinafter, a printer) 1000 as shown in Fig. 1. There is no need to say that this invention can be applied even to single body equipment, a system consisting of a plurality of equipment, or a system to be processed through a network such as LAN, as long as the functionality of the present invention is implemented.

[0026] In the drawing, an element 3000 is a host computer and comprises a CPU 1 executing processing of documents formed by mixing drawings, images, characters, tables (including text calculation, etc.), and the like on the basis of a document process program or the like stored in the ROM for programming of the ROM 3, and the CPU 1 collectively controls respective devices connected to a system bus 4. A control program or the like of the CPU 1 is stored in the ROM for programming of the ROM 3 and various

kinds of data to be used for the above mentioned document process, etc. is stored in a ROM for font of the ROM 3.

[0027] An element 2 is a RAM, which functions as a main memory, a work area, etc. for the CPU 1. An element 5 is a keyboard controller (KBC), which controls key input from a keyboard or a pointing device not shown in the drawings. An element 6 is a CRT controller (CRTC), which controls display of a CRT display (CRT) 10. An element 7 is a memory controller (MC) and controls access to a hard disc (HD) for storing boot programs, various kinds of applications, font data, user files, edit files, etc. and an external memory 11 such as a floppy disc (FD).

[0028] An element 8 is a printer controller (PRTC), which is connected to the printer 1000 through a specific two-way interface (interface) 21 and executes communication control process with the printer 1000. The CPU 1 can execute character development (rasterize) process of outline fonts onto a display information RAM configured on the RAM 2, for example, and perform WYSIWYG on the CRT 10. The CPU 1 opens various kinds of windows registered on the basis of a command indicated by a mouse cursor and the like not shown in the drawing on the CRT 10 and executes various kinds of data process.

[0029] In the printer 1000, an element 12 is a printer CPU (CPU), which collectively controls access to various kinds

of devices connected to the system bus 14 on the basis of
the control program and the like stored in the ROM for
programming of the ROM 13 or the external memory 14 and
outputs image signals as output information to a print part
(printer engine) 17 connected through a print part interface
(print part I/F) 16.

[0030] Control programs and the like of the CPU 12 as shown
in the flow chart in Fig. 4 are stored in the ROM for
programming of the ROM 13. Font data and the like to be
used when preparing the output information are stored in the
ROM for font of the ROM 13, and for a printer without an
external memory 14 such as a hard disk, information and the
like to be used on the host computer are stored in the ROM
for data of the ROM 13.

[0031] The CPU 12 can communicate with the host computer
3000 through an input part 18 and is constructed so as to
report information in the printer to the host computer 3000.
An element 19 is a RAM, which is constructed so as to extend
memory capacity by an option RAM which functions as a main
memory, a work area, etc. of the CPU 12 and is connected to
an extension port not shown in the drawings.

[0032] The RAM 19 may have an output information
development area, an environmental data storing area, etc.
secured therein and include an NVRAM (nonvolatile RAM).
Access of the above-mentioned external memory 14 such as a

hard disc (HD), an IC card, etc. is controlled by a memory controller (MC) 20. The external memory 14 is connected optionally and stores font data, emulation program and the like. An element 1012 is the above-mentioned operation panel, which has switches for operation and LED indicators thereon.

[0033] The above-mentioned external memory 14 should not be limited to one and may be constructed so as to comprise at least one memory and connect the plurality of memories storing option font cards in addition to internal fonts and programs for interpreting printer control languages in different language systems. It may also have an NVRAM, which is not shown in the drawings, and store printer mode set information from the operation panel 1012.

[0034] Fig. 3 is a drawing illustrating transition of a printer state display image displayed on the CRT 10 shown in Fig. 2, exemplarily showing an image displayed by the application based on the flow chart shown in Fig. 7 to be described later operated on the host computer shown according to the present embodiment.

[0035] As shown in (a) of Fig. 3, an element 301 is a printer selection image for a user to select any of, for example first to third printers P1-P3 of which state is desired to be known, and it is constructed so as to select any of the printers P1-P3 by a keyboard, a pointing device

not shown in the drawings, and the like.

[0036] As shown in (b) of Fig. 3, an element 302 is a state display image, which is displayed after selecting any of the printers at the printer selection image 301 and displaying operation state of the selected printer. An element 303 is an operation direction box, which is a simulation image of the operation panel 1012 of the printer and the character string display column 304 displays state of the printer in characters.

[0037] An element 305 is a state diagram display box, which displays state diagram as an image showing operation state of a printer 1000, showing a drawing informing a user of state of the printers, for example when an error occurs, by changing the color of part where the error occurs and by displaying the operation state with an animation.

[0038] The application regarding the present embodiment periodically (every T seconds) monitors state of the printer 1000 by commands and when it detects state change of the printer 1000, it notifies it to the user by changing the display character strings of the character display column 304 and state diagram of the state diagram display box 305.

[0039] Fig. 4 is a view illustrating a correspondence table of printer statuses and status codes transferred from the printer 1000 to the host computer 3000 illustrated in Fig. 2, and the correspondence table is stored in the ROM 13 of the

printer 1000.

[0040]   In the figure, a table (a) is a first status table in which printer statuses common to the respective types of printers and the corresponding status codes are stored. A table (b) is a second status table in which printer statuses as specific states of the respective types of printers (for example, toner shortage error for an LBP, ink shortage error for an ink jet printer, etc.) and the corresponding status codes are stored therein.

[0041]   The status codes are numbers corresponding to the printer statuses one by one.

[0042]   Fig. 5 is a view illustrating one example of data transferred from the printer 1000 to the host computer 3000 illustrated in Fig. 2, and corresponding relation between the status codes and message character strings stored in the ROM 13 of the printer 1000 shown in Fig. 2 as a table.

[0043]   In the figure, a table (a) is a first code message correspondence table in which status codes common to the respective types of printers and the corresponding message character strings are stored. A table (b) is a second code message correspondence table in which status codes specific to the respective types of printers and the corresponding message character strings are stored.

[0044]   Accordingly, the correspondence table is divided into the first code message correspondence table (machine

type common part) and the second code message correspondence table (machine type dependent part), and the host computer can acquire a desired staple and display state of the printer by issuing a status request command to the printer independently for the first and second code message correspondence tables.

[0045] As a result, the printer 1000 can transmit the first and second code message correspondence tables shown in Fig. 5 to the host computer 3000, and the host computer 3000 can acquire the message character strings corresponding to the statuses by referring to the transmitted correspondence tables by the host computer 3000.

[0046] In the following, characteristic structure of the present invention is described referring to Fig. 2, etc.

[0047] The data processor which is structured as shown above and can communicate with a plurality of printers through a specific communication medium has an acquisition means (RPTC 8) for acquiring status display resources from the printers, a storage means (RAM 2) for storing the status display resources acquired from the acquisition means, and a control means (CPU 1) for displaying the statuses of the respective printers at a display part according to status information reported from the respective printers and the status display resources stored in the storage means, and thereby, the statuses of the printers can be displayed

without holding status display resources in a storage part in advance and even when a newly developed printer is introduced, the statuses of the printers can be displayed without newly introducing an application.

[0048] Additionally, the status display resources include reportable status codes and message character string data corresponding to the status codes (as in the correspondence table shown in Fig. 5), and thereby, the status codes and the message character string data corresponding to the status codes can be acquired from the printer to the data processor, and status display conditions can be freely maintained at low cost for every kind of different machines.

[0049] The status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers (as in the correspondence table shown in Fig. 5), and thereby, not only statuses which are common to respective machine types but also statuses which are different for respective machine types can be displayed with simple architecture.

[0050] The message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers (as in the correspondence table shown in Fig. 5), and thereby, the message character string data which are common to the

respective printers and the message character string data
which are specific to the respective printers can be
acquired and different statuses for each printer can be
securely displayed according to the message character string
data which are common to the respective printers and the
message character string data which are specific to the
respective printers.

[0051] The specifying means (keyboard 9) for specifying a
language of the message character string data in the status
display resources acquired by the acquisition means is
provided, and thereby, a message can be displayed in a
language desired by a user.

[0052] The print controller which can communicate with a
data processor through a specific communication medium has
the storage means (ROM 13) for storing status display
resources and a transmission means (input part 18) for
transmitting the status display resources to the data
processor according to acquisition request of the status
display resources transmitted from the data processor, and
thereby, not only the display resources common to the
respective machine type but also statuses different for the
respective machine type can be provided to the data
processing device side and the status display condition can
be freely established.

[0053] The status display resources include reportable

status codes and message character string data corresponding to the status codes (as in the correspondence table shown in Fig. 5), and thereby, the status codes and the message character string data corresponding to the status codes can be transmitted to the data processor.

[0054]   The status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers (as in the correspondence table shown in Fig. 5), and thereby, the statuses which are common to respective printers and statuses which are different for respective printers can be transmitted to the data processor.

[0055]   The message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers (as in the correspondence table shown in Fig. 5), and thereby, the message character string data which are common to respective printers and the message character string data which are specific to the respective printers can be transmitted to the data processor.

[0056]   Referring to Figs. 6 and 7, a data processing method by the printer and the host computer illustrating an embodiment of the present invention is described.

[0057]   Fig. 6 is a flow chart illustrating a first data

processing procedure in a printer according to an embodiment of the present invention, and corresponds to an entire process procedure of the printer. Numerals (1)-(13) indicate respective steps.

[0058] Whether data are input from the host computer 3000 or not is determined (1), when the data are determined not to be input, input is continued to be waited for, and when the data are determined to be input. Data input process is performed (2) and the data are analyzed (3).

[0059] Next, it is determined whether the analysis result for the input data is a printer state acquisition command or not (4), and when the result is determined to be the printer state acquisition command, a status code indicating uniquely the state of the printer 1000 is transmitted to the host computer 3000 (5), and then the procedure is returned to Step (1).

[0060] While in Step (4), when the analysis result is determined not to be a printer state acquisition command, it is determined whether the analysis result for the input data is a machine type information acquisition command or not (6), and when the result is determined to be the machine type information acquisition command, machine type information indicating uniquely the machine type of the printer 1000 is transmitted to the host computer 3000 (7), and then the procedure is returned to Step (1).

[0061]   While in Step (6), when the analysis result is determined not to be a machine type information acquisition command, it is determined whether the analysis result for the input data is a correspondence information request command of the message character strings and the status codes or not (8), and when the result is determined to be the correspondence information request command of the message character strings and the status codes, a correspondence table of the status codes and the message character strings stored in the ROM 13 and shown in Fig. 5 is transmitted to the host computer 3000 (9), and then the procedure is returned to Step (1). In Step (9), the printer transmits both information at once in Step (9) and the host computer acquires the information.

[0062]   While in Step (8), when the analysis result is determined not to be a correspondence information request command of the message character string and the status codes, it is determined whether the analysis result is a paper discharge command or not (10), and when the result is determined to be the paper discharge command, contents of a frame buffer for storing print images are converted into video signals for printing at a print part 17 (11) and for discharging paper (12), and then the procedure is returned to Step (1).

[0063]   While in Step (10), the analysis result is

determined no to be a paper discharge command, a drawing

process is performed according to a command as the analysis

result for the input data (13), and then the procedure is

returned to Step (1) for waiting for input.

[0064] Fig. 7 is a flow chart illustrating a second data

processing procedure in a data processor according to an

embodiment of the present invention and corresponds to a

procedure by an application operated on the host computer

3000. Numerals (1)-(13) indicate respective steps.

[0065] When the application is started on the host computer

3000, the printers connected on the network are investigated,

the printer selection image 301 shown in Fig. 3 is displayed

(1), it is determined whether the object printer is input

from the pointing device or the keyboard 9 (2), when it is

determined not to be input, input by the user is continued

to be waited for, and when it is determined to be input, the

object printer is determined (3).

[0066] Next, a machine type information request command is

transmitted to the object printer, machine type information

is acquired (4), and a language specifying command of

message is transmitted for determining a language (5). The

kind of language is previously determined on the application

side. Next, a command requesting the correspondence table

of the status codes and the message character strings is

transmitted (6), the correspondence table transmitted from

the corresponding printer 1000 side is received, and the application receives the correspondence table of the status codes and the message character strings shown in Fig. 5 and stores it in the RAM 2 (7).

[0067] The host computer applicable to a print system of this embodiment can independently request and acquire information of the machine type common part and the machine type dependent part of the correspondence table shown in Table 5. In this step, both information is requested and acquired. The status codes are numerals uniquely indicating statuses of the printer and are determined by the correspondence table of the printer statuses and the status codes shown in Fig. 4.

[0068] Next, the printer state request command is transmitted to the object printer, and the status codes are received as response (8). The status display image 302 shown in Fig. 3 corresponding to the printer input in Step (2) is displayed according to the status codes, the status codes are converted into the message character strings with the correspondence table of the status codes and the message character strings acquired in Step (7), and a message is displayed at a character string display column 304 shown in Fig. 3 (9).

[0069] Next, in order to monitor printer state for every T seconds, it is waited for T seconds passing (10). After

passing T seconds, the status codes are acquired by transmitting the printer state request command (11), the status codes acquired in Step (11) and that acquired previously are compared to determine whether the statuses are changed or not (12), when the status codes are determined not be changed, the procedure is returned to Step (10), when they are determined to be changed, display contents of the state display image 302 are updated according to the acquired status codes (13), and the procedure is returned to Step (10).

[0070] In the following, characteristic structure of the present invention is described referring to Figs. 6 and 7.

[0071] In a data processing method of a data processor which can communicate with a plurality of printers through a specific communication medium or a storage medium for storing a program readable by a computer which can communicate with a plurality of printers through a specific communication medium, a first reception step (Step (7) in Fig. 7) of receiving the status display resources transmitted from the printers, a storage step (Step (7) in Fig. 7) of storing the status display resources received at the first reception step into a storage part (RAM 2), a second reception step (Step (8) in Fig. 7) of receiving status information reported from the respective printers, and a display step (Step (9) in Fig. 7) of displaying

statuses of the respective printers at a display part according to the status information received at the second reception step and the status display resources stored in the storage part are provided, and thereby, the statuses of the printers can be displayed without holding status display resources in a storage part in advance and even when a newly developed printer is introduced, the statuses of the printers can be displayed without newly introducing an application.

[0072] In the data processing method of a print controller which has a storage part (ROM 13) for storing the status display resources and can communicate with the data processor through the specific communication medium or the storage medium for storing a program readable by a computer which has a storage part (ROM 13) for storing the status display resources and can communicate with the data processor through a specific communication medium, the transmission step (Step (9) in Fig. 6) of transmitting the status display resources to the data processor on the basis of acquisition request of the status display resources transmitted from the data processor is provided, and thereby, not only the display resources common to the respective machine type but also statuses different for the respective machine type can be provided to the data processor side and the status display condition can be freely established.

[0073] There is no need to say that the present invention can be applied even when for the printer status acquisition command transmitted from the host computer 3000 to the printer 1000, not only the same logical channel as for printing data but also other channels in an interface having a plurality of logical channels are used.

[0074] It is also no need to say that the present invention can be applied even when for the input part 18 of the printer 1000, not only an interface built in the printer 1000 but also an interface board attachable to/detachable from the printer 1000 body are used.

[0075] There is further no need to say that the present invention can be applied even when information of the machine type common part of the correspondence table of the status codes and the message character strings shown in Fig. 5 is previously stored in an application program and the host computer 3000 receives only correspondence information of the message character strings and the status codes of the machine type dependent part from the printer 1000 side.

[0076] In the following, structures of the data processor and a data processing program which can be read by the print controller regarding the present invention are described referring to a memory map shown in Fig. 8.

[0077] Fig. 8 is a view illustrating a memory map of a storage medium for storing various kinds of data processing

programs which can be read by a data processor and a print controller related to the present invention.

[0078] Though not specifically shown in the drawings, it would be also possible that information for managing a group of programs stored in the storage medium, for example, version information, a creator, etc. is stored as well as information dependent on an OS and the like on the program reader side, for example, icons or the like for identifying and displaying programs are also stored.

[0079] Data dependent on various kinds of programs are also managed in the above mentioned directory. It would be also possible that programs for installing various kinds of programs into a computer and those for unfreezing compressed programs to be installed are stored.

[0080] It would be also possible that functions shown in Figs. 6 and 7 according the present embodiment are implemented by the host computer with programs installed from outside. In that case, the present invention can be applied even when a group of information including programs is supplied to an output device by a storage medium such as a CD-ROM, a flash memory, FD, etc. or from an external storage medium via a network.

[0081] As described above, There is no need to say that an object of the present invention can be accomplished even when a storage medium for storing program codes of software

for implementing functions of the above mentioned embodiments is supplied to a system or a device, and a computer (or a CPU, an MPU) of the system or the device reads out the program codes stored in the storage medium for execution.

[0082] In this case, the program codes read out from the storage medium are for implementing new functions of the present invention, and the storage medium for storing the program codes also constitutes the present invention.

[0083] As for the storage medium for supplying such program codes, for example, a floppy disc, a hard disc, an optical disc, a magneto-optical disc, a CD-ROM, a CD-R; a magnetic tape, a non-volatile memory card, a ROM, an EEPROM, etc. can be used.

[0084] There is no need to say that the functions of the above mentioned embodiments are implemented by executing the program codes read out by the computers and that a case when an OS (operating system) and the like operated on the computer according to directions of the program codes performs partly or entirely the actual processing and the functions of the above mentioned embodiments are implemented by the processes is also included in the present invention.

[0085] There is no need to say, too, that a case when a CPU and the like provided to a function expanded board built in a computer or function expanded unit connected to the

computer executes partly or entirely actual processing according directions of the provided program codes after writing of the program codes read out from the storage medium in a memory provided to the function expanded board or the function expanded unit and by the processing, the functions of the above-mentioned embodiments can be realized is also included in the present invention.

[0086]

[Advantages] As described above, according to the first invention regarding the present invention, a data processor which can communicate with a plurality of printers through a specific communication medium has an acquisition means for acquiring status display resources from the printers, a storage means for storing the status display resources acquired from the acquisition means, and a control means for displaying the statuses of the respective printers at a display part according to status information reported from the respective printers and the status display resources stored in the storage means, and thereby, the statuses of the printers can be displayed without holding status display resources in a storage part in advance and even when a newly developed printer is introduced, the statuses of the printers can be displayed without newly introducing an application.

[0087] According to the second invention, the status

display resources include reportable status codes and
message character string data corresponding to the status
codes, and thereby, status display conditions can be freely
maintained at low cost for every kind of different machines.

[0088] According to the third invention, the status codes
include common status codes which are common to the
respective printers and status codes which are specific to
the respective printers, and thereby, not only statuses
which are common to respective machine types but also
statuses which are different for respective machine types
can be displayed with simple architecture.

[0089] According to the fourth invention, the message
character string data include message character string data
which are common to the respective printers and message
character string data which are specific to the respective
printers, and thereby, the message character string data
which are common to the respective printers and the message
character string data which are specific to the respective
printers can be acquired, different statuses for each
printer can be securely displayed according to the message
character string data which are common to the respective
printers and the message character string data which are
specific to the respective printers.

[0090] According to the fifth invention, the specifying
means for specifying a language of the message character

string data in the status display resources acquired by the acquisition means is provided, and thereby, a message can be displayed in a language desired by a user.

[0091] The sixth invention is the print controller which can communicate with a data processor through a specific communication medium, wherein the print controller has the storage means for storing status display resources and a transmission means for transmitting the status display resources to the data processor according to acquisition request of the status display resources transmitted from the data processor, and thereby, not only the display resources common to the respective machine type but also statuses different for the respective machine type can be provided to the data processing device side and the status display condition can be freely established.

[0092] According to the seventh invention, the status display resources include reportable status codes and message character string data corresponding to the status codes, and thereby, the status codes and the message character string codes corresponding to the status codes can be transmitted to the data processor.

[0093] According to the eighth invention, the status codes include common status codes which are common to the respective printers and status codes which are specific to the respective printers, and thereby, the statuses which are

common to respective printers and the statuses which are specific to the respective printers can be transmitted to the data processor.

[0094] According to the ninth invention, the message character string data include message character string data which are common to the respective printers and message character string data which are specific to the respective printers, and thereby, the message character string data which are common to respective printers and the message character string data which are specific to the respective printers can be transmitted to the data processor.

[0095] According to the tenth and eleventh inventions, in a data processing method of a data processor which can communicate with a plurality of printers through a specific communication medium or a storage medium for storing a program readable by a computer which can communicate with a plurality of printers through a specific communication medium, a first reception step of receiving the status display resources transmitted from the printers, a storage step of storing the status display resources received at the first reception step into a storage part, a second reception step of receiving status information reported from the respective printers, and a display step of displaying statuses of the respective printers at a display part according to the status information received at the second

reception step and the status display resources stored in the storage part are provided, and thereby, the statuses of the printers can be displayed without holding status display resources in a storage part in advance and even when a newly developed printer is introduced, the statuses of the printers can be displayed without newly introducing an application.

[0096] According to the twelfth and thirteenth inventions, in the data processing method of a print controller which can communicate with the data processor through the specific communication medium or the storage medium for storing a program readable by a computer which can communicate with a plurality of printers through a specific communication medium, the transmission step of transmitting the status display resources to the data processor on the basis of acquisition request of the status display resources transmitted from the data processor, and thereby, not only the display resources common to the respective machine type but also statuses different for the respective machine type can be provided to the data processing device side and the status display condition can be freely established.

[0097] Accordingly, a data processor and a print controller, a data processing method of the data processor and of the print controller, and a storage medium for computer-readable program, capable of acquiring every kind of different status

display resources and freely reporting the state of a

printer to a user according status information transmitted

from the printer without holding status display resources in

a host computer in advance can be provided at low cost.

[Brief Description of the Drawings]

[Fig. 1]   A sectional view illustrating architecture of a

laser beam printer applicable to a printer according to an

embodiment of the present invention;

[Fig. 2]   A block diagram illustrating architecture for

controlling a data processor and a printer according to an

embodiment of the present invention;

[Fig. 3]   A view illustrating transition of a status display

screen displayed at a CRT illustrated in Fig. 1;

[Fig. 4]   A view illustrating a correspondence table of

printer statuses and status codes transferred from the

printer to the host computer illustrated in Fig. 2;

[Fig. 5]   A view exemplarily illustrating data transferred

from the printer to the host computer illustrated in Fig. 2;

[Fig. 6]   A flow chart illustrating a first data processing

procedure in a printer according to an embodiment of the

present invention;

[Fig. 7]   A flow chart illustrating a second data processing

procedure in a data processor according to an embodiment of

the present invention; and

[Fig. 8]   A view illustrating a memory map of a storage

medium for storing various kinds of data processing programs
which can be read by a printing system related to the
present invention.

[Reference Numerals]

1: CPU

2: RAM

3: ROM

10: CRT

12: CPU

13: ROM

17: Print part

19: RAM

1000: Printer

3000: Host computer

Fig. 2

3: FONT ROM

PROGRAM ROM

DATA ROM

11: EXTERNAL MEMORY

13: FONT ROM

PROGRAM ROM

DATA ROM

14: EXTERNAL MEMORY

16: PRINT PART I/F

17: PRINT PART

18: INPUT PART

1000: PRINTER

1012: OPERATION PANEL

3000: HOST COMPUTER

Fig. 3

P1: PRINTER 1

P2: PRINTER 2

P3: PRINTER 3

303, 304: PRINT ENABLED

Fig. 4

(a) STATUS TABLE (COMMON TO MACHINE MODEL)

PRINTER STATUS

PRINT ENABLED

SLEEP CONDITION

COVER OPEN

PAPER SHORTAGE ERROR

JAM ERROR

STATUS CODE

(b) STATUS TABLE (DEPENDANT ON MACHINE MODEL)

PRINTER STATUS

( ) ERROR

( ) ERROR

STATUS CODE

Fig. 5

(a) CORRESPONDENCE TABLE OF STATUS CODE AND MESSAGE

CHARACTER STRING (COMMON TO MACHINE MODEL)

STATUS CODE

MESSAGE CHARACTER STRING

"PRINT ENABLED"

"SLEEP"

"COVER OPEN"

"PAPER SHORTAGE ERROR"

"JAM ERROR"

(b) CORRESPONDENCE TABLE OF STATUS CODE AND MESSAGE

CHARACTER STRING (DEPENDANT ON MACHINE MODEL)

STATUS CODE

MESSAGE CHARACTER STRING

"( ) ERROR"

"( ) ERROR"

Fig. 6

START

(1) INPUT DATA ?

(2) DATA INPUT

(3) DATA ANALYSIS

(4) STATE ACQUISITION COMMAND ?

(5) STATE INFORMATION TRANSMISSION

(6) MACHINE MODEL INFORMATION ACQUISITION COMMAND ?

(7) MACHINE MODEL INFORMATION TRANSMISSION

(8) MESSAGE/STATE CORRESPONDING INFORMATION ACQUISITION

COMMAND ?

(9) MESSAGE/STATE CORRESPONDING INFORMATION TRANSMISSION

(10) PAPER DISCHARGE COMMAND ?

(11) PRINT

(12) PAPER DISCHARGE

(13) DRAWING PROCESS

Fig. 7

START

(1) DISPLAY SCREEN 301 OF FIG. 3

(2) INPUT ?

(3) OBJECT PRINTER DETERMINATION

(4) MACHINE MODEL INFORMATION ACQUISITION

(5) MESSAGE LANGUAGE SPECIFYING COMMAND TRANSMISSION

(6) REQUEST COMMAND TRANSMISSION OF MESSAGE CHARACTER STRING
AND STATUS CODE CORRESPONDING INFORMATION

(7) RECEPTION OF MESSAGE CHARACTER STRING AND STATUS CODE
CORRESPONDING INFORMATION

(8) STATUS CODE ACQUISITION

(9) DISPLAY SCREEN 2 OF FIG. 3

(10) T SECONDS ELAPSED ?

(11) STATUS CODE ACQUISITION

(12) STATUS CHANGED ?

(13) IMAGE UPDATE

Fig. 8

STORAGE MEDIUM SUCH AS FD/CD-ROM

DIRECTORY INFORMATION

FIRST DATA PROCESSING PROGRAM

GROUP OF PROGRAM CODES CORRESPONDING TO STEPS IN FLOW CHART
ILLUSTRATED IN FIG. 6

SECOND DATA PROCESSING PROGRAM

GROUP OF PROGRAM CODES CORRESPONDING TO STEPS IN FLOW CHART
ILLUSTRATED IN FIG. 7

MEMORY MAP OF STORAGE MEDIUM